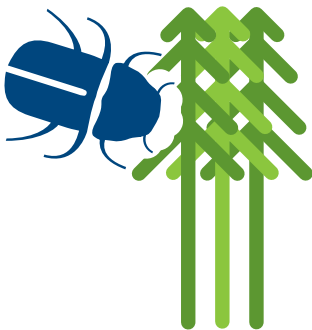# WOOD-PELLET-FIRED BIOMASS BOILERS

OPPORTUNITY

What are the benefits to using Biomass Boilers?

DRIVE USE OF LOCALLY SOURCED RENEWABLE ENERGY

TAKE ADVANTAGE OF WASTE WOOD
PINE-BEETLE INFESTATION HAS KILLED 17.7 MILLION ACRES OF U.S. FOREST[1]

TECHNOLOGY

How do Biomass Boilers work?

POWER HOT-WATER-HEATING SYSTEMS
WITH SOLID WOOD FUEL

85%–90%
EFFICIENCY RATING

M&V

Where did Measurement and Verification occur?

NATIONAL RENEWABLE ENERGY LABORATORY evaluated efficiency, cost-effectiveness, and operational functionality of a 1-million BTU biomass boiler at the Federal Building in Ketchikan, Alaska

RESULTS
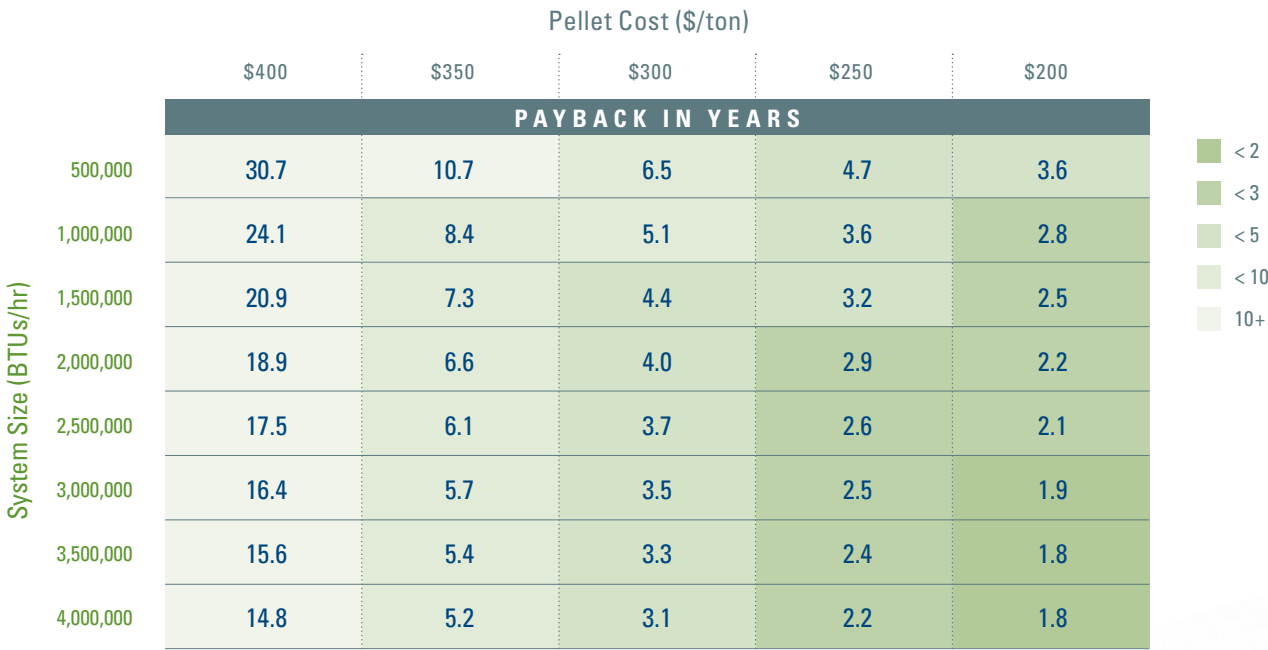
How did Biomass Boilers perform in the M&V?

85.6%
BOILER EFFICIENCY
AT 45% PARTIAL LOAD[2]; INCREASED LOAD WILL INCREASE EFFICIENCY[3]

HIGH FUNCTIONALITY
LOW O&M COSTS[4]

<5 YEARS
PAYBACK OPERATING AT 75% CAPACITY WITH AVERAGE PELLET COSTS[5]

Payback Varies by System Size and Pellet Cost
Savings are greatest with larger systems and lower fuel costs

System Size (BTUs/hr)	Pellet Cost ($/ton)				
	$400	$350	$300	$250	$200
PAYBACK IN YEARS					
500,000	30.7	10.7	6.5	4.7	3.6
1,000,000	24.1	8.4	5.1	3.6	2.8
1,500,000	20.9	7.3	4.4	3.2	2.5
2,000,000	18.9	6.6	4.0	2.9	2.2
2,500,000	17.5	6.1	3.7	2.6	2.1
3,000,000	16.4	5.7	3.5	2.5	1.9
3,500,000	15.6	5.4	3.3	2.4	1.8
4,000,000	14.8	5.2	3.1	2.2	1.8

Legend: < 2 | < 3 | < 5 | < 10 | 10+

Diesel Price $3.63/gallon; 75% capacity factor
(At a 50% capacity factor, the payback period increases 30%)

DEPLOYMENT

Where does M&V recommend deploying Biomass Boilers?

HOT-WATER HEATED FACILITIES USING FUEL OIL
Most cost-effective for buildings in cold northern climates within 50 miles of a biomass pellet mill

[1]US Forest Service, Western Bark Beetle Strategy, Human Safety, Recovery and Resiliency, 7/11/2011 [2]Wood-Pellet-Fired Biomass Boiler Project at the Ketchikan Federal Building. Gregg Tomberlin (NREL), June 2014, p3 [3]Ibid, p.12 [4]Ibid, p.23 [5]Ibid, p.29

GSA

GPG Green Proving Ground Program

The Green Proving Ground program leverages GSA's real estate portfolio to test innovative building technologies and provide recommendations on their deployment. **www.gsa.gov/gpg**